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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/480,193	01/10/2000	Shi-Jun Yang	IR 3556	4031

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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 03/17/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)	
09/480,193	YANG ET AL.	
Examiner	Art Unit	
Nikolas J. Uhler	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6 and 8-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) none is/are allowed.
- 6) ☒ Claim(s) 1,3-6 and 8-17 is/are rejected.
- 7) ☒ Claim(s) 1,12,16 and 17 is/are objected to.
- 8) ☐ Claim(s) none are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This office action is in response to the amendment/request for continued examination dated 1/22/03. The amendment dated 12/16/02 has been entered into the file and has been considered by the examiner. Claims 1, 3-6, and 8-17 are pending.

2. The examiner has carefully considered applicant's amendments and arguments and has carefully reconsidered the applied prior art. While the applicant's amendments to claims 1, 12, 16, and 17 to insert various property requirements are sufficient to overcome the applied US Patent 4876311 to Hennig et al. as a 35 U.S.C 102(b) reference, the examiner feels that Hennig et al. still reads on applicant's claims as a 35 U.S.C 103(a) reference, as it has not yet been established on the record that certain formulations disclosed by Hennig will not necessarily meet the material property limitations that are newly added to the claims. A clear explication of the examiner's position follows.

Claim Objections

3. Claims 1, 12, 16 and 17 are objected to because of the following informalities: "78.9" should be 78.9%. Appropriate correction is required.

4. Claim 12 is objected to because of the following informalities: "methyl" in line 7 of the claim should be "methyl methacrylate." Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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6. Claims 1, 3-6, and 8-14, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hennig et al. (US4876311).

7. To be clear on the record, it is noted that the examiner interprets the limitation "highly crosslinked" to mean that 0.1-5% by weight of a crosslinking agent is utilized to crosslink the particles, as is commensurate in scope with the description of the formation of "highly" crosslinked particles on page 8 paragraph 3 of the instant specification, unless a more specific amount of crosslinking agent is claimed.

8. The limitations of claim 16 require a resin comprised of 60-85% by weight of a matrix comprised of polymethyl methacrylate; 15-40% by weight of highly crosslinked spherical polymeric particles that are comprised of 15-35% by weight styrene, 65-85% methyl methacrylate and 0.1-1.5% by weight allyl methacrylate, wherein the polymeric particles have a mean particle size between 25-55 μ m, and a particle size distribution between 15-100 μ m, wherein if the resin is extruded into a .125in thick sheet, the sheet has a haze number \geq 90%, an opacity \geq 10%, a minimum surface roughness in the range of 0.5-30 μ m, and a total white light transmission $>$ 78.9%.

9. With respect to these limitations, Hennig et al. (hereafter Hennig), teaches a resin composition that comprises a polymer matrix that contains crosslinked polymeric beads (column 2, lines 58-60). The polymer matrix can be one of several different resins, with acrylic resins including methyl methacrylate being preferred (column 6, lines 4-8). It is noted that Hennig teaches a specific example utilizing polymethyl methacrylate (PMMA) as the matrix resin (column 7, lines 8-20).

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10. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize PMMA as the matrix resin in the invention of Hennig, as PMMA is recognized by Hennig as equivalent to the other resins listed as suitable for forming the matrix.

11. The applicant is respectfully reminded that substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In Re Fount* 213 USPQ 532 (CCPA 1982); *In Re Siebentritt* 152 USPQ 618 (CCPA 1967); *Grover Tank & Mfg. Co. Inc V. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

12. Regarding the polymeric beads incorporated into the resin, Hennig teaches a specific example wherein polymeric beads suitable for use in the invention are formed by reacting 5.9kg methyl methacrylate, 4.0kg styrene and 0.1kg glycol dimethacrylate (crosslinking agent) to form beads having a median particle size of 37 microns and a refractive index of 1.53 (columns 6-7 example 1). In other terms, this example reacts 59% by weight methacrylate, with 40% by weight styrene and 1% by weight crosslinking agent, thus meeting all of the required ranges for the composition of these components of claim 16. The examiner acknowledges that this particular example in Hennig utilizes glycol methacrylate as opposed to the allyl methacrylate crosslinking agent required by claim 16. However, Hennig teaches that suitable crosslinking agents for the particles include vinyl, allyl, and crotyl esters of acrylic or methacrylic acid, as well as other crosslinking agents such as glycol methacrylate (column 4, lines 11-34).

13. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize allyl methacrylate instead of glycol methacrylate as the

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crosslinking agent for crosslinking the particles of Hennig, as allyl methacrylate is recognized by Hennig to be equivalent to glycol methacrylate as a suitable crosslinking agent.

14. Regarding the relative amounts of the matrix resin and the crosslinked particles, Hennig teaches that the polymeric particle/matrix composite is comprised of 70-99% by weight of the polymer matrix mixed with 1-30% by weight of the polymeric particles (column 7-8, claim 1). As 70% by weight matrix and 30% by weight polymeric particles is completely encompassed by the applicants claimed ranges for these components in claim 16, the range limitations of claim 16 are met.

15. Regarding applicants requirements in claim 16 regarding the specific haze, opacity, roughness, and light transmission properties of the resin "if the resin is extruded into a 0.125in thick sheet." The examiner takes the position that these limitations are met by the composition of Hennig et al., particularly when a resin composition comprising 70% by weight polymethyl methacrylate, and 30% by weight of the polymeric particles elucidated by Hennig's example 1 is formed. This composition comprises the same matrix polymer (PMMA) as that utilized by the applicant in the specification and required by the instant claim 16. The composition further comprises polymeric particles that meet all of the applicant's claimed compositional requirements.

16. It is of particular note that the applicant in the instant specification states that the "The frosted appearance of the thermoplastic compositions is achieved through the mismatch of the refractive indexes, $\Delta n > 0.02$, of the fine particles and the thermoplastic

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matrices. The surface texture is controlled by the degree of crosslinking and mean size of the fine particles" (Specification page 3, lines 26-31).

17. It is noted that Hennig specifically teaches that the polymeric matrix and the polymeric particles preferably differ in refractive index by a factor of 0.04 (column 5, lines 64-67), thus meeting the applicants description of the refractive index difference necessary for obtaining the required frosted appearance (this also meets the limitations of claim 5). Further it is noted that the amount of crosslinking agent utilized by Hennig is completely encompassed by range specified by the applicant in claim 16. Thus, in light of the fact that the same monomers are utilized to form the particles, as well as the same amount (and in many cases the same type) of crosslinking agent is used by Hennig it is logical to believe the particles are crosslinked to the same degree as that of the applicant. As the applicant specifically states that surface texture (i.e roughness) is controlled by the degree of crosslinking of the particles, it is logical to believe that when the resin composition of Hennig is extruded to a thickness of 0.125μ , the applicants claimed roughness limitations will be met.

18. Last, while the examiner acknowledges that Hennig teaches that the invention is directed towards the formation of "opaque" resins, it is noted that Hennig teaches an example wherein a composition according to his invention is extrude to a thickness of 3.2 mm ($\sim .125$ in) and has a light transmission of 87-89%. Thus, it appears that "opaque" as utilized by Hennig does not refer to the amount of light transmission through an extruded resin film of his composition. It is further noted that Hennig teaches a specific example wherein the resin is extruded at a material temperature of 245°C ,

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which is close to the same temperature utilized by the applicant as described on page 20 of the instant specification. Thus, in light of these similarities, the examiner takes the position that the haze, opacity, light transmission and roughness limitations of claim 16 will be met by the composition of Hennig, particularly when a resin composition comprising 70% PMMA and 30% particles is utilized.

19. The examiner believes the above recitation reads on the limitations of claims 1, 3-5, 6, 8-10, 12-14 and 16-17 as stated above, as claim 16 includes all of the limitations of these claims. Regarding claim 11, wherein the applicant requires the crosslinking agent to be divinyl benzene. Hennig specifically teaches that divinyl benzene is a suitable crosslinking agent (column 4, lines 11-27).

20. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize divinyl benzene as the crosslinking agent in Hennig, as divinyl benzene is recognized by Hennig as equivalent to the other crosslinking agents listed as suitable.

21. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hennig et al. (US4876311) as stated above for claim 1, further evidenced by Minghetti (US6077575).

22. Hennig teaches all of the limitations required by claim 15 except for those listed below.

23. Hennig et al. does not teach the incorporation of a colorant within the polymeric particles.

24. Although Hennig et al. does not disclose that a colorant may be added to the polymeric particle composition, the examiner takes the position that this is merely design choice. It has been shown that the addition of a colorant to particles formed in a similar manner and of a similar composition to those described by Hennig et al. is known, as evidenced by Minghetti, column 5, lines 35-36. Further, it is well known to add a colorant to any material in order to improve its aesthetic appeal.

25. Therefore it would have been obvious to one with skill in the art at the time the invention was made to incorporate a colorant into the polymeric particles described by Hennig et al.

26. One would have been motivated to make this modification because of the improved aesthetic appeal of the resulting article one would expect to gain as a result.

Response to Arguments

27. The examiner carefully considered all of the applicants arguments related to the prior art applied. In the instant case, the applicant argues that the Hennig et al. reference does not take into consideration translucency or a textured surface, which the applicant contends are key portions of the intention.

28. Regarding the argument related to translucency. This argument is not persuasive. The applicant in the argument defines translucency as total white light transmission. The examiner respectfully points out that the examples of Hennig are transparent to greater than 80% of incident light. Thus in light of the transmission properties disclosed by the examples of Hennig, this argument is unpersuasive.

29. Regarding the argument relating to textured surface. The examiner acknowledges that Hennig does not explicitly teach this limitation. However, it is respectfully noted that the applicant in the instant specification states, "The surface texture is controlled by the degree of crosslinking and mean size of the fine particles" (Specification page 3, lines 26-31)." It is further noted that the invention of Hennig utilizes particles that are formed from the same monomers, have similar or identical particle size, are crosslinked with same amount and the same type of crosslinking agent, and that the film of Hennig is formed via a similar process as that utilized by the applicant. It has not yet been established on the record that the sheet formed by Hennig does not necessarily possess the properties required by the applicant. In light of all of the similarities shared by the instantly claimed invention and that of the prior art, a mere assertion that the prior art does not have the required roughness is unpersuasive without a clear definitive showing that the prior art indeed possesses different surface structure than that of the instant invention.

Examiners Note

30. The examiner notes that that a copy of the Hennig and Minghetti references accompanied a prior office action, and so copies of these references have not been included with this office action.

31. Further, without wishing to direct or instruct the applicant in any way, the examiner respectfully suggests that the applicant clearly present any unexpected results that may arise from the specific formulation of the instantly claimed resin. A specific comparison of the instantly claimed invention to that of the formulations presented by

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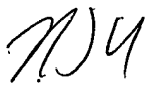
Hennig would be persuasive. In particular a comparison of the instant invention to a 70% PMMA, 30% polymeric particles (comprising 59% by weight methyl methacrylate, 40% by weight styrene and 1% crosslinking agent) as described by Hennig that clearly shows that the composition of Hennig would be most persuasive, and would establish on the record that the formulation disclosed by the prior art does not necessarily possess the applicants claimed material properties.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.


nju
March 12, 2003


Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700